

Abstract

An apparatus for measuring spectral characteristics of received light and determining multi-bit data values based on light coupled to spectral sensors via one or more light receivers is disclosed. Light is received by one or more light receivers, which preferably may be fiber optics. At least a portion of the light received by the light receivers is coupled to spectral sensors via the light receivers. The spectral sensors measure the intensity of at least a portion of the received light in one or more predetermined spectral bands. A processor receives data corresponding to light intensities measured by the spectral sensors. The processor determines a data value of at least two bits based on the received light measured in each of the one or more predetermined spectral bands. The data value for each spectral band is determined based on the measured light intensity level of light received by the light receivers and coupled to the spectral sensors in each spectral band. Preferably, at least one spectral band is a reference band, and the processor determines the data value for each of the one or more predetermined spectral bands based on a measured intensity value of the reference band. Preferably, the one or more light receivers is/are moved relative to an object or material, and a plurality of data values are determined as the one or more light receivers is/are moved relative to the object or material. A measured intensity value of the reference band may be used to determine a position or speed of movement value of the one or more light receivers relative to the object or material. Preferably, at least one data value is determined as a function of a measured intensity in one spectral band and a measured intensity in a second spectral band. The apparatus may be used as a color bar code reader. The received light may pass through one or more interference filter elements prior to being measured by the one or more spectral sensors, which may constitute a color gradient filter. The spectral sensors may be one or more light to frequency converter sensing elements.